

DISCUSSION OF EXAMINER'S OFFICE ACTION

Objections to the specification

"Versenex" is now capitalized where it appears and is accompanied by the generic terminology.

Claim Objections

The Examiner objected to claim 3. Claim 3 was canceled, so this rejection is no longer relevant.

Claim Rejections - 35 U.S.C. § 102 (b)

The Examiner rejected claims 1-6, 8 and 18-20 under 35 U.S.C. 102 (b) as being anticipated by US 2002/0188040 (Chen), but the Examiner did not reject claim 7 under 35 U.S.C. 102 (b) because Chen does not contain any examples or any specific teaching which disclose that the first cationic polymer of the water soluble cationic polymer composition comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer of the water soluble cationic polymer composition comprises 70 to 100 weight percent of cationic monomers. Since claim 1, which is the only claim now pending, includes this novel limitation, Applicants submit that amended claim 1 is not anticipated by Chen under 35 U.S.C. 102 (b).

Claim Rejections under 35 U.S.C. § 103 (a)

The Examiner rejected claims 1-8 and 18-20 under 35 U.S.C. 103 (a) as being clearly anticipated by US 202/0188040 (Chen). The reasons for this rejection are set forth at pages 3-7 of the Office Action and will not be restated here. As Applicants mentioned before, amended claim 1 is now the only claim pending, and amended claim 1 contains the novel limitation of original claim 7, which required that the first cationic polymer of the water soluble cationic polymer composition comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer of the water soluble cationic polymer composition comprises 70 to 100 weight percent of cationic monomers.

Obviousness analysis in accordance with *Graham V. John Deere* approach

Graham v. John Deere, 383 U.S. 1, 148 U.S.P.Q. 459 (1966) outlined the approach that must be taken when determining whether an invention is obvious 35 U.S.C. §103 (a). In *Graham*, the Court stated that a patent may not be obtained if the subject matter would have been obvious at the time the invention was made to a person having ordinary skill in the art, and emphasized that non-obviousness must be determined in the light of inquiry, not quality (*supra* at page 467). In accordance with *Graham*, three inquiries must be made in determining whether an invention is obvious:

- (1) The scope and content of the prior art are to be determined.
- (2) The differences between the prior art and the claims at issue are to be ascertained.
- (3) The level of ordinary skill in the pertinent art resolved.
- (4) Objective evidence relevant to the issue of obviousness.

Applicants will now set forth their analysis of obviousness in view of the requirements of *Graham V. John Deere* and the Office Action issued by the Examiner.

Scope and content of the prior art

Chen discloses a water-soluble interjacent complex prepared from ethylenically unsaturated polymerizable monomers. The water soluble complex includes a first water-soluble polymer and one or more water-soluble monomers polymerized to form a second water-soluble polymer in the presence of the first water-soluble polymer. Chen refers to the first water-soluble polymer the "host" polymer and the second water-soluble polymer the intercalated polymer. Although Chen does mention some preferred embodiments for the water-soluble complex, the host polymer, and the intercalated polymer, Chen describes the water-soluble complex, the host polymer, and the intercalated polymer in very broad terms:

[0040] Any ethylenically unsaturated polymerizable monomer can be used in the present invention¹, so long as the resulting interjacent complex is water-soluble.

¹ Applicants interpret this to mean that any unsaturated polymerizable monomer can be used to make the first polymer and the second polymer of the interjacent complex.

[0041] The host polymer can be a synthetic polymer, such as those produced by free radical polymerization or condensation polymerization, or it may be a natural polymer, such as a natural gum, a starch, a modified starch, a cellulosic, a modified cellulosic, a water-soluble natural gum, water-soluble modified natural gums, proteins, or protein derivatives. Examples of host polymers that can be used in the present invention include, but are not limited to, water-soluble vinyl polymers, water-soluble olefin containing copolymers, water-soluble polyacrylates, water-soluble polyamides, water-soluble polyesters, water-soluble polyurethanes, xanthan gums, sodium alginates, galactomanans, carageenan, gum arabic, cellulose and its derivatives, such as hydroxyethyl cellulose and hydroxypropyl cellulose, starch and its derivatives, guar and its derivatives, proteins and their derivatives, water-soluble poly(meth)acrylates, water-soluble polyamides, water-soluble polyesters, water-soluble polyurethanes, water-soluble poly(vinyl alcohol), water-soluble poly(vinyl amine), water-soluble poly(ethylene imine), water-soluble amine/epihalohydrin polyamines, water-soluble poly(meth)acrylamide, water-soluble (meth)acrylamide copolymers, water-soluble poly(meth)acrylic acid, water-soluble copolymers of (meth)acrylic acid, poly(diallyl dimethyl ammonium halides), copolymers of diallyl dimethyl ammonium halides, water-soluble vinyl pyrrolidone, water-soluble copolymers of vinyl pyrrolidone, poly(meth)acrylamidopropyltrimethyl ammonium halides, copolymers of (meth)acrylamidopropyltrimethyl ammonium halides, poly(meth)acryloyloxyethyltrimethyl ammonium halides, copolymers of (meth)acryloyloxyethyltrimethyl ammonium halides, poly(meth)acryloyloxyethyltrimethyl ammonium methyl sulfate, and copolymers of (meth)acryloyloxyethyltrimethyl ammonium methyl sulfate.

[0052] Any suitable cationic monomer may be used to make the intercalated polymer of the present invention.

Applicants' claimed compositions

According to amended claim 1, Applicants' compositions are powdery, water-soluble, cationic polymer compositions comprising at least a first and a second cationic polymer. The

amended claim defines the first and second cationic polymer and their relationship with great specificity.

According to the amended claim, the first cationic polymer has a weight-average molecular weight higher than 1 million g/mol and the second cationic polymer has a weight-average molecular weight lower than 1 million g/mol. Additionally, the first and second cationic polymers comprise (a) corresponding structural units, (b) are formed using cationic monomers selected from the group consisting of cationized esters of (meth)acrylic acid and cationized amides of (meth)acrylic acid, in each case comprising a quaternized N atom, (c) the first cationic polymer has a lower cationic charge density than the second cationic polymer, and (d) the first cationic polymer comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer comprises 70 to 100 weight percent of cationic monomers.

The first cationic polymer is formed by radical polymerization of its monomer constituents in the presence of the second cationic polymer in aqueous solution according to the method of adiabatic gel polymerization, and the ratio of the second to the first cationic polymer is from 0.01:10 to 1:3.

The compositions are used for solid-liquid separation, retention aids in paper manufacture, and in sludge dewatering/wastewater purification. The powders can be transported more inexpensively by virtue of their almost anhydrous condition.

It has been found in practice that the water soluble cationic polymer compositions containing the first and second cationic polymer, where the first cationic polymer is formed by radical polymerization of its monomer constituents in the presence of the second cationic polymer in aqueous solution, perform better in dewatering applications than mixtures of similar polymers, such as those disclosed in EP 262 945.

Differences between Chen's compositions and Applicants' claimed compositions

The claims were amended to clearly specify the differences and relationships between the first cationic and second cationic polymer used in Applicants' water soluble cationic polymer compositions. Specifically, the claims as amended require that (a) the first cationic polymer has a weight-average molecular weight higher than 1 million g/mol while the second cationic polymer has a weight-average molecular weight lower than 1 million g/mol, (b) the first and second cationic polymers comprise corresponding structural units, (c) the first and the second cationic

polymer are formed using cationic monomers selected from the group consisting of cationized esters of (meth)acrylic acid and cationized amides of (meth)acrylic acid, in each case comprising a quaternized N atom, (d) the first cationic polymer has a lower cationic charge density than the second cationic polymer, (e) the first cationic polymer comprises 20 to 90 weight percent of cationic monomers while the second cationic polymer comprises 70 to 100 weight percent of cationic monomers, and (f) the ratio of the second to the first cationic polymer is from 0.01:10 to 1:3.

Although Chen's generic disclosure is broad enough to include these specifications for the first cationic polymer and second cationic polymer, Chen does not specifically teach or disclose this combination of characteristics and these specific relationships between the first and second cationic polymers. Furthermore, Chen does not teach or suggest these characteristics of the first cationic polymer and second cationic polymer and their relationships in connection with the requirement that the first cationic polymer comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer comprises 70 to 100 weight percent of cationic monomers.

Reasons Applicants are not obvious

Chen does not teach or suggest a cationic polymer composition where the first and second cationic polymers are specifically defined as they are in amended claim 1, have the relationship as defined in claim 1, and where the first cationic polymer comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer comprises 70 to 100 weight percent of cationic monomers.

Furthermore, evidence indicates that the cationic polymer compositions have improved dewatering characteristics when compared to the compositions described in EP 262 495. In this regard, Applicants wish to direct the Examiner's attention to the comparison polymers (5-9) described at page 14 to page 15 of their patent application. The comparison polymers were prepared with MADAME-quat and acrylamide in accordance with the procedures described EP 262 495. The amounts of MADAME-quat and acrylamide used to prepare the first cationic polymer are set forth in Table I below.

Polymer compositions (V5-V9) were prepared by mixing one of the comparison polymers with a second cationic polymer K1 (poly-DADMAC, Mw 300,000). Some of the essential data of the comparison polymer compositions are summarized in the following table:

Table I

Comparison polymer compositions (V)	V5	V6	V7
First cationic polymer (amounts of monomer used to prepare polymer)			
MADAME-quat.	100 g	106.7	80 g
Acrylamide	-	40 g	80 g
Amount of second cationic polymer			
K1 (poly-DADMAC, Mw 300,000)	250 g	250 g	250 g
Cationicity of polymer composition (V)	100 wt%	72.7 wt%	50 wt%

Two other comparison polymer compositions were also prepared (V8 and V9). These compositions were prepared in essentially the same manner as V5 to V7, except the starting temperature for preparing the first cationic polymer varied.

Applicants request that the Examiner note that the first and second cationic polymer according to comparison examples V5 to V9 are derived from different cationic monomer units (MADAME and DADMAC respectively), whereas the first and second cationic polymer of Applicants' composition have a corresponding structural unit, i.e. there is at least one common cationic monomer used to prepare the first cationic polymer and the second cationic polymer. Furthermore, Applicants request that the Examiner note that amended claim 1 does not read on compositions where the first cationic polymer or second cationic polymer is prepared from DADMAC because DADMAC is neither an ester nor amide of (meth) acrylic acid.

Polymer compositions V5 to V9 were compared to compositions within the scope of amended claim 1 with respect to their dewatering characteristics. The procedure for comparing the dewatering characteristics of the polymers is described at pages 10-11 of the patent application ("Determination of the dewatering effect by the screen-test method").

Experiments demonstrated that the comparison compositions (V5 to V9) do not achieve dewatering that is satisfactory when added in quantities at which the polymer compositions achieve satisfactory dewatering results. Applicants submit that this result is unexpected and could not have been predicted from the prior art.

When considering whether Applicants' water soluble cationic polymer compositions are obvious, Applicants ask the Examiner to recognize the danger of employing "hindsight" in his analysis. This danger is inherent in the examination process since the Examiner knew what the novel water soluble cationic polymer compositions were when he conducted his patentability search and concluded that the compositions were obvious. On the other hand, the only information Applicants had at the time the novel water soluble cationic polymer compositions were discovered was the teachings of the prior art, so the inquiry related to obviousness must focus on the content of what the prior teaches and suggests to the person of ordinary skill in the art at the time the invention was made. In this regard, Applicants hope that the Examiner will keep in mind the following comments excerpted from *In re Kotzab*, 55 U.S.P.Q. 2d 1313 (Fed. Cir. 2000) at page 1317:

A critical step in analyzing the patentability of claims pursuant to section 103 (a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. See *Dembiczak*, 175 F.3d at 999, 50 USPQ2d at 1617. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher. *Id.* (quoting *W.L. Gore & Assocs., Inc. v Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303,313 (Fed. Cir. 1983)).²

Applicants submit that in the situation at hand, one skilled in the art could not have arrived at the water soluble cationic polymer compositions defined by claim 1 without employing hindsight. Chen does not teach or suggest a cationic polymer composition where the first and second cationic polymers are specifically defined as they are in amended claim 1, have the relationship as defined in claim 1, and where the first cationic polymer comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer comprises 70 to 100 weight

²See *In re Kotzab*, 55 U.S.P.Q. 2d 1313 (Fed. Cir. 2000) at page 1317.

percent of cationic monomers. Furthermore, Chen does not teach or suggest that these water cationic polymer compositions would have improved dewatering characteristics.

Double patenting

The Examiner provisionally rejected the claims for obviousness-type double patenting over the claims 1-9 of co-pending application serial number 10/567,664 in view of Chen. The Examiner contends that the '664 application teaches all the limitations of the pending claims in the instant application, except for the limitation that first cationic polymer and second cationic polymer of the water soluble cationic polymer composition comprise "corresponding structural units". He states that the '664 application teaches that the two cationic polymers differ in the composition of the cationic groups, but that Chen teaches examples wherein the first and second polymers have corresponding structural units (example 1, page 8) and examples wherein the polymers different in their cationic structural units (example 4, page 9). Therefore, it would obvious to one of ordinary skill in the art that the compositions in the co-pending applications could be made with either different or corresponding cationic units.

Applicants disagree with the Examiner's conclusion because amended claim 1 is limited to water soluble cationic polymer composition comprise where the first cationic polymer and second cationic polymer have corresponding structural units, and, as the Examiner acknowledges, Chen is not limited to such water soluble cationic polymer compositions. Furthermore, there is another limitation of amended claim 1 which is not found in the independent claims of Chen. This is that first cationic polymer of the water soluble cationic polymer comprises 20 to 90 weight percent of cationic monomers and the second cationic polymer of the water soluble cationic polymer comprises 70 to 100 weight percent of cationic monomers. Finally, Examples 1 and 4 of Chen, to which the Examiner refers, disclose the use of DADMAC as one of the monomers to synthesize the first cationic polymer and/or the second cationic polymer, and amended claim 1 does not read on compositions where the first cationic polymer or second cationic polymer is prepared from DADMAC because DADMAC is neither an ester nor amide of (meth) acrylic acid.

. In view of these differences defined by amended claim 1 of the presently claimed invention, Applicants submit that amended claim 1 is patentably distinct from the '664 patent application in view of Chen.

Conclusion

Applicants submit that the application is now in condition for allowance and respectfully request a notice to this effect. If the Examiner believes further explanation of Applicants' position is needed, Applicants' attorney will discuss this matter over the telephone or visit the Examiner personally if this may be useful.

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